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GAS IN A LONDON SUBURB

SURVEYING the possible markets for gas in the varied trades of a suburb of a great Metropolitan City—serving a million inhabitants—Messrs. Johnson and Moore have, in their Paper to the Institution of Gas Engineers, incidentally, produced a social document of considerable interest. Not only have they collected detailed information, with facts and figures not to be found together elsewhere as far as we know, but they have described the methods of feeding this vast population, at home and abroad, of keeping it warm in its meeting places for worship and entertainments, of dressing its hair and of attending to all the demands for heat in communal life. There is much wisdom, too, in their discussion of sales method. Considerable insight into human nature is needed to distinguish between experience and prejudice. The latter is to be met with good humour and never with frontal attack. An amusing instance is that of the baker. The most common type of oven in use in this district is as old in design as the art of bread-making. It is a solid brick-built chamber in which the fire itself is kindled. When the brickwork is hot, the embers are raked out, the oven is cleaned and the dough is introduced into the hot chamber. Undeterred by its obvious inefficiency, inconvenience and consequent costliness, "some bakers assert that bread tastes sweeter when baked in this type of oven than in any other." But—"the wise salesman never contradicts such statements." He waits until he can persuade someone to try just the ordinary gas-fired sheet-steel cased oven, presumably not essentially different from the gas cooker, which will give equally good results at less cost, of fuel and labour combined, than the older types, and then competition will do the rest.

With such an attitude towards their job it is easy to see how Messrs. Johnson and Moore justify their view that selling gas to butchers and bakers is not just a matter of organization, smart address, "well-drilled sales talk," but "a personal matter between consumer and salesman." And the latter must acquire a working knowledge of the consumer's trade and the problems which confront him. Here we have the quantitative information upon which such knowledge can be based. The big undertaking, employing several salesmen, can allow each to specialize in groups of similar trades. For instance, the catering trades can be grouped together and one representative, our Authors say, can cover 500 premises, the number of representatives being assessed not by the number of establishments already using gas but by the number which ought to be.

Gas is so obviously the correct fuel for most forms of cooking and particularly baking, and bread-making is so fundamental a necessity of civilized life that it was well to study it so closely. The significant point is that, in Wandsworth, of the potential annual load of 1,681,000 therms only 90,850 therms, or 5%, has been secured. This must be a measure of possible expansion in many districts.

Baking, fish frying, hotels and restaurants, and hair-dressing are studied in detail, essential figures being given in every case ("A cabinet having a capacity of 9 cu.ft. will handle up to 300 towels per day for a consumption of about 1½ therms"). The treatment of space heating and hot water supply is more generalized, but in every case cited figures are given which should prove of interest and value to everyone dealing with similar problems. And there is no merit in ignoring the objections to the use of gas in certain situations, particularly the presence of organic sulphur (which must go) and the high moisture content of the products of combustion. But above all, its high cost. This objection is not one to be met in any defeatist spirit. "Gas is a high-grade servant with special qualifications and those who use it must expect to pay a high salary" as well as to use it with finesse and economy. This Paper is a mine of figures obtained in practice which will serve to inform or check those wishing to study when, and why, as well as how, gas can be applied to a particular purpose in urban or suburban life.

At the end of the Paper was a short essay on "Promotional Tariffs and Commercial Users." Preference was expressed for tariffs evenly applied to each group of trades, but different according to the character of the trade and what it can afford to pay for fuel. But its "general considerations of price structure" are applicable to all users. Some day the Industry may be empowered to deal with the "uneconomic consumer." In the meantime there is a point where the consumer pays the whole cost of the service; above this point he should not be required to do too much by way of subsidizing his neighbour who does not pay his share. When you can devise a tariff which makes it clear to the consumer that this point of elementary justice has been attended to, you have devised "a promotional tariff."

BUILDING ON FOUNDATIONS

BEFORE leaving the subject of the commercial uses of gas we would refer to a Paper given some little time ago by Mr. Garrud and Mr. Tyrell, which we are publishing in serial form in "GAS SERVICE"; the final instalment will appear in the August issue. The Authors of that Paper mentioning incidentally that during the two decades between the two wars their Company—the Gas Light and Coke—has shown an increase in the amount of gas supplied to industrial premises of 200%, indicate what can be done by tackling this phase of the Gas Industry's multiple activities with forethought and initiative. Success has obviously been achieved; and success inevitably brings with it responsibility—and in this particular instance responsibility could be described as determination to ensure really good service from the supply of gas in adequate quantity and correct quality to the production of the finished goods.

We have mentioned previously in these columns that an essential start to successful selling and service of industrial gas—and indeed this applies to domestic consumption as well—is a simple tabulation and selective system of classifying consumers, and possibly in the past there has been great diversity of opinion in this regard. But more recently the Industrial Gas Centres Committee has got down to the matter, and it is obviously desirable that their deliberations should be in collaboration with the statistical department of

the Ministry of Fuel and Power, and should have this Department's approval. There are so many advantages of an efficient and an agreed consumer classification. Primarily, it facilitates the selection of trades for studying of specific processes and appliances applicable to them; it makes more easily available gas consumption details for statistical and load factor purposes; it aids in formulation of the right types of promotional tariff to gain these loads in competition with other sources of energy; and in general it provides a basis for promotional market research. The most important point of all is that such a scheme should be generally accepted by the Gas Industry.

Such a commonsense classification is the one sure foundation for the development of the industrial and commercial business of our Industry. For nearly seven years little selling, in the sense understood in pre-war days, has been undertaken. The whole work of the Industry has been taken up in satisfying demands which have, throughout these years, exceeded supply of gas. Is it reasonable to expect that such a state of affairs will continue? There is no doubt about it, we must plan for our future selling. Other industries are doing so. Concerning this, much can be left to the individual skill of the industrial representative and his enthusiasm and knowledge of local conditions and industries. But this is insufficient. He must, as we have said, be supported by appropriate tariffs and essentially by appliances of the right kind. The potential load certainly exists. The Authors of the Paper on which this note is based point out that London is a great industrial area, the scope of which is not generally appreciated. In fact, there are more factories and people employed in them in Greater London than in any of the 16 areas into which the country was divided at the time of the 1935 census. In 1938, in the County of London alone, there were nearly 37,000 factories and workshops employing approximately 750,000 people. In the Greater London area the number of people employed in this work was about 1,250,000. Obviously, the market exists. Figures over the past 20 years do, indeed, indicate the increasing response of industry generally to the use of gas. The extent of the full increase will depend largely on the Gas Industry's attracting the right type of personnel, adopting a progressive sales and service policy, and paying adequate attention to the question of publicity. All manner of fields the fringes of which, as yet, have hardly been touched, exist. We have mentioned some of the fields dealt with by Messrs. Johnson and Moore. As a further example there is the sphere of overhead radiant heating for factories and large buildings; in this field alone it is estimated that if all factories in the area of the Gas Light and Coke Company used gas for heating, the Company's sales would be increased by double what they were pre-war.

BRITISH GAS STAFF ASSOCIATION

WE have followed with interest the developments that have taken place in connexion with gas staff organization in the last two or three years, and we welcome—even if it does mean adding the B.G.S.A. to the already long list of abbreviations employed in the Gas Industry—the announcement that the committee appointed jointly by the Gas Staff Association and the Central Committee of Gas Staff Associations to bring about amalgamation has successfully accomplished its mission. The members themselves have decided the issue and the newly constituted British Gas Staff Association brings the only side of the Industry so far without a united national body into line with employers, chief officials, technical staffs, and manual workers, in having a single organization of its own. In its old form, with one Association claiming national status and several others linked together through a Central Committee, the movement was bound to fall short of the ideal aimed at by its originators. Now that the several units have merged into one Association any misgivings which provincial staffs may have entertained have been removed, and recruitment of members and formation of local branches will be correspondingly more easy. We have not yet learned officially that the B.G.S.A. is recognized by the Federation of Gas Employers, but such recognition would be a natural sequel having regard to the fact that the sponsoring bodies were so regarded.

In an Industry so highly organized as the Gas Industry, a Staff Association is a necessary component in the machinery of negotiation. There is no question of encroaching on managerial control; all that is implied is the fair representation of staff people with facilities to discuss and settle such controversial matters as may arise. The machinery on the employers' side is so constructed that it can best deal with an Association similarly organized. At the same time the constitution of the new Association contemplates direct negotiation on matters which can be settled locally. Briefly, the aims and objects of the new Association are to secure the greatest measure of co-operation between employers and staffs with a view to increased efficiency of the public service, to raise professional status, to obtain recognition as the official body representative of all grades, and to safeguard the interests of staffs of undertakings affected by amalgamation or other changes in working arrangements.

Membership is open to all grades of staff employees and the ultimate aim is 100% membership, a figure which has already been approached in the London district. Grading of salaries for administrative, technical, and clerical staffs has been investigated and a report, which has been approved by the members, is ready to go forward to the proper quarter. The necessity for extending this to the higher technical grades has been recognized and in consultation with other bodies involved further proposals are under consideration. Matters already dealt with successfully include consolidation of salaries, review of superannuation schemes, education and training, junior welfare, holiday concessions, legal advice service, and distribution of technical literature. Like all other sections of the Industry, the Association has been considering nationalization proposals, and representations have been made to the Ministries and official departments concerned. It is the avowed purpose of the Association to uphold the reputation gained as reasonable men and women anxious to play their full part in the progress of the Industry.

In our editorial in last week's issue discussing the article by Dr. Maxted and Dr. Priestley on Organic Sulphur Removal from Gas, we inadvertently referred to the large-scale experimental plant as being at the Otley Gas-Works. The large-scale work was, of course, undertaken at the Works of the Mirfield Gas Company.

Personal

Mr. F. COOPER, who joined the Workington Gas Department 12 years ago, has been appointed Showroom Manager and Industrial Salesman to the Motherwell and Wishaw Gas Department, and begins his new duties in September.

* * *

Mr. ALBERT ORMROD, formerly Deputy Chief Chemist with Liverpool Gas Company, has joined the staff of the Manchester Oxide Co. Ltd., and will be engaged with Mr. H. B. Avery in purification matters.

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Mr. RALPH BINT has been appointed Chief Clerk to the Blackpool Gas Department. At present he holds a similar position with the Oxford and District Gas Company, which he joined in 1921. He takes up his new appointment on Oct. 1.

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Mr. J. B. FLEMING, Deputy Engineer and Manager of the Stalybridge Gas Department, has been appointed Engineer and Manager of the Marple Gas Department. He was educated at Dumbarton Academy and Glasgow University and received his training with the Glasgow Gas Department. Before going to Stalybridge two years ago he was Chief Engineering Assistant at Halifax.

* * *

Mr. CHARLES BATEMAN, General Manager of the Bath Gas Company, has been elected to a seat on the Board of the Company with effect from July 1. Mr. Bateman succeeded Mr. J. Wesley Whimster as Engineer and Manager of the Company in 1945. Prior to this, he was General Manager of the York, Harrogate, and District Group of Gas Companies.

Letters to the Editor

High Pressure Gas Holders

DEAR SIR,—I have read with interest the letter published in the "GAS JOURNAL" of July 10, and note that your correspondent takes exception to the statement I made at the meeting of the Institution of Gas Engineers, when Mr. Gill's valuable Paper on high-pressure gasholders was discussed. Mr. Hollis, after misquoting my remarks, says he has had considerable practical experience with riveted high pressure vessels, and that he has still to find a high pressure riveted holder in this country which is absolutely tight under working conditions.

It will be evident to your readers, from Mr. Hollis' remarks, that he has had very little experience of riveted pressure vessels, otherwise he would know that there are a number of riveted high pressure holders erected in various parts of this country which are giving every satisfaction and are tight under working conditions. Riveted boilers are pressure vessels working under much more severe conditions than high pressure gasholders, but it would be ridiculous to suggest that these are never really tight when at work. Most of the well known gasholder manufacturers are able to use riveted or welded construction, whichever is the more desirable for the different classes of work they undertake, and there is, of course, no need for them to boost welding at the expense of riveting, or *vice versa*. If Mr. Hollis will refer to the Technical Press, he will also find written evidence that one of the earliest riveted cylindrical pressure holders erected in this country is "bottle tight" under working conditions. The largest high pressure holder in this country, described in the "GAS JOURNAL" of July 10, is to be of riveted construction, and other orders recently placed for large high pressure holders of between 20 and 30 ft. diameter, are also of riveted design. I can assure Mr. Hollis that in all these cases careful consideration has been given to the question as to whether riveted or welded construction should be adopted.

The practice of hammering or flogging the welded seams of vessels under hydraulic pessure, is to test the soundness of the weld. It is well known that a crack or slag inclusion or small blow holes in the weld metal, if not detected, may result in disastrous consequences to the container when used for the storage of air or gas at high pressure. Failure of welded seams when subject to tensile loading acting normally to the joint, is usually sudden when it occurs.

It is difficult to ensure a weld absolutely free from small blow holes and inclusions, and these may be present even in what might be considered very good weld metal. This uncertainty with regard to welding has given rise to a number of non-destructive methods of testing welded joints, such as X-ray, stethoscopic, and magnetographic examination.

I should like to know exactly what Mr. Hollis means by flogging the riveted seams. Does he wish to imply that a 7 lb. hammer is to be used to deform the rivet heads and damage the edge of the plating, or does he mean that the plating adjacent to the rows of rivets is to be struck normally with a hammer? With riveted seams, no flogging such as is used by test welded seams, is necessary, as the strength of the joint can be relied upon provided it is properly designed, and no one, with the exception of Mr. Hollis, would suggest flogging a riveted seam with a 7 lb. hammer to test its soundness.

Mr. Hollis refers to the report that the only ship which was relatively untouched by the atom bomb at Bikini was a welded vessel. This gives us very little information, as the vessel may not have been in the path of the blast, or it may have been anchored at a greater distance from the bomb than the riveted ships which were damaged.

I am pleased that Mr. Hollis has provided an opportunity of discussing this important question, and I shall be interested to read his further comments.—Yours faithfully,

Wellington, Salop. S. M. MILBOURNE.
July 12, 1946.

Dear Sir,—During the discussion of Mr. G. M. Gill's Paper on High-Pressure Gasholders at the recent Institution meeting, Mr. J. McNair, of Skipton, claimed that "Skipton possesses the oldest high-pressure holder in this country." This claim was made, no doubt, in ignorance of the existence of two small high-pressure gasholders which I installed for the Harrogate Gas Company at their Boroughbridge Depôt in the spring of 1930—three years prior to the construction of the Skipton holder.

These two high-pressure holders at Boroughbridge were each 30 ft. long by 9 ft. diameter, with dished ends and designed for a pressure of 50 lb. per sq.in., with riveted seams. They are situated 11 miles from the gas-works at Harrogate at the end of a high-pressure main which supplies en route several villages through district governors and local low-pressure mains, and also, as a boosting main, into the Harrogate distribution system and the holders at Knaresborough.

During the peak loads, especially at mid-day, the draw on this main is very heavy and it is then that the benefit of the high-pressure holders comes in as the gas is fed back into the high-pressure main and takes up the outer district load.

Shortly after their installation the old column-guided holder had to be rebuilt, and during that time the high-pressure holders dealt with the whole load of the villages en route and also the load of Boroughbridge with very satisfactory results. Two small compressors of 3,000 cu.ft. an hour each were installed, coupled to the high pressure main and driven by a gas engine through belts and a countershaft. The only difficulty experienced was to keep the stuffing glands tight against the high pressures used. Totally enclosed compressors of an improved type are now available which overcome this difficulty, and any escape of gas through the glands can be led away from the casing to the low-pressure system. Two Reynolds governors were used—one to break down the high-pressure to 5 or 6 lb. for feeding back into the high-pressure main and the other for feeding direct into the low-pressure system when required.

Apart from taking up the peak load, these holders enable a full supply to be given to the intervening villages during periods when repairs or alterations to the high-pressure system are in progress between Knaresborough and Boroughbridge.

I understand that the installation is still giving satisfaction after 18 years, while the cost of compression and maintenance is quite reasonable. The scheme has been amply justified and experience has borne out the views of Mr. Gill and Mr. McNair as to the merits of high pressure holders.—Yours faithfully,

FRANK H. ROBINSON.

6, Stray Walk, Harrogate.
July 10, 1946.

Manchester Association at Bradford

For the Manchester District Association of Gas Engineers July 5 was "President's Day"—an occasion when the members gathered in force to visit the City of which Mr. G. E. Currier is Gas Engineer and Manager—Bradford. Mr. Currier must have been well pleased with the numbers who gathered together to pay enthusiastic tribute to his work for the Association and for the City of Bradford; equally well pleased were the visitors—of this we are sure—with the cordiality of the hospitality which met them at every turn of a full day's programme. In the morning the Birkshall Works of the Gas Department—now the only gas manufacturing station in the City—were visited. An account of these works and of contemplated development was given by Mr. Currier at the end of April last in the course of his Presidential Address, and was published in the "JOURNAL" of May 1. Without going into detail, we may recall that it was in 1937 that gas manufacture was centralized at this works and that considerable development marked the period 1939-45. It was in 1942 that, to meet rapidly increasing demand for gas, arrangements were made to take a supply of gas from the Grid of the West Yorkshire Gas Distribution Company up to a maximum of 15 million cu.ft. per week, so increasing the total productive capacity to 81 million cu.ft. per week.

Following the inspection of the works, those present were entertained at a luncheon given in the Banqueting Hall of the Town Hall by the Chairman (Councillor J. Cariss) and members of the Bradford Gas Committee. At this function the toast of the Manchester District Association of Gas Engineers was in the hands of Councillor Cariss, who paid tribute to the sterling work of Mr. Currier, who suitably responded. Dr. E. W. Smith, C.B.E. (President of the Institute of Fuel), proposed the "City of Bradford," response being made by the Lord Mayor (Alderman K. Chambers). The final toast was "Our Guests," proposed by Councillor E. England (Deputy Chairman of the Gas Committee) and replied to by Mr. Edward Crowther (General Manager of the Newcastle-upon-Tyne and Gateshead Gas Company and Junior Vice-President of the Institution of Gas Engineers).

Thereafter there was a visit to Messrs. Field, Sons & Co., Ltd., Colour Printers, at whose works "Ideal" gas-fired boilers are installed, having a total evaporation capacity of 11,700 lb. per hour with a normal working pressure of 7 lb. per sq.in. The steam generated is used for the air conditioning plant and is automatically controlled for temperature and humidity. It is also used for steam unit heaters in sections of the works where humidity control is not required, for the provision of hot water, and normal low-pressure heating of the office block.

The Need for Films on industrial subjects is realized by the Scientific Film Association who are carrying out the important task of cataloguing those films which already exist. A preliminary list is already obtainable from the Association at a charge of 2s. each. The S.F.A. is anxious to receive information about films in order that they may be added to the existing list. The title of the film, the source from which it may be hired or borrowed, and other relevant particulars, should be sent to the Hon. Secretary, Industrial Committee, Scientific Film Association, 34, Soho Square, W.1.

Cumberland and Westmorland Gas Managers' Association

After a virtual suspension of activities owing to war-time travel restrictions, the Cumberland and Westmorland Gas Managers' Association held a meeting at Workington on June 20, under the Presidency of Mr. J. George Pope, Engineer and Manager, Workington Gas Department. There was a good attendance of members, and opportunity was taken to discuss and decide on various domestic matters chiefly concerned with future activities.

The following Officers were appointed for 1946-47:—*President*, Mr. J. George Pope (Workington); *Vice-President*, Mr. T. H. Large (Maryport); *Hon. Secretary*, Mr. W. B. Hetherington (Keswick).

Members inspected the Humphreys and Glasgow hand-clinkered producer gas plant recently installed at Workington, also a Fordson Major tractor modified for shunting railway wagons.

Tea was provided by the kindness of the Mayor and Corporation of Workington at the close of an enjoyable meeting.

The producer gas plant was installed for the purpose of diluting coke oven gas to give a calorific value of 500 B.Th.U. per cu.ft. for distribution. Briefly, the plant consists of a well-insulated, brick-lined producer and wash-box. Air is supplied by means of a centrifugal fan with electric prime mover, delivering air at 30 in. w.g., a standby unit being provided. Steam is supplied from the works' boilers at 100 lb./sq.in., and the steam/air mixture to the producer controlled on the saturation temperature by an Arca temperature regulator operating on the steam supply.

From the wash-box the gas passes through a scrubber, and from thence *via* a meter to the purifier inlet, where it is mixed with oven gas at a pressure of approximately 20 in. The coke or breeze is supplied to the generator by means of a special skip and electric hoist, charging being carried out about every two hours, and occupying about three minutes.

The producer is manually clinkered, one clinkering each day being required when working continuously, the process being carried out in a matter of minutes. The plant is designed for a production up to 10,000 cu.ft. of producer gas per hour. At this rate the calorific value of the gas made from oven coke nuts exceeds 130 B.Th.U./cu.ft.

The tractor which the members inspected is the new Fordson "Major," fitted with a shunting attachment, comprising 5 in. by 3 in. mild steel angles from rear axle housing to mild steel buffer plates at front and rear. A cab is provided for the driver, and 11 by 36 Land utility rear pneumatic wheels and 600 by 19 front wheels are fitted. The tractor is easily manœuvred in confined places, and carries out shunting operations with ease.

Edinburgh Against State Control

By 33 votes to 19, Edinburgh Corporation has decided against the principle of the nationalization of the Gas Industry. The matter arose on a memorandum from the British Gas Council and on a letter from the Scottish District of the Council inviting the Corporation's member representatives to attend a meeting in Edinburgh on July 30.

Submitting the motion, Mr. Sawers said they were very proud of their gas undertaking, which was an outstanding example of successful municipal enterprise, and he was certain that long-range bureaucratic control from London would not yield satisfactory results for the consumers.

An amendment was moved by Mr. James Campbell that their representatives be instructed to indicate at the conference that the Corporation were in favour of the nationalization of the Gas Industry. He agreed that publicly-owned gas undertakings, and also some of the privately-owned companies, were exceedingly well managed, but he contended that the time had come when the Industry should be unified as a whole. It was vital that investigations and research into the best methods of producing and distributing gas and utilizing its by-products should not be left to piecemeal development.

"If we look at this from a national standpoint," said Mr. Earsman, seconding, "the only conclusion is that there must be reorganization of the Industry." People living in outlying districts who were in the grip of holding companies paid from 200% to 300% more for their gas than Edinburgh consumers.

Supporting the amendment, Mr. Adam Millar said the income from Edinburgh Gas Department was about £1,250,000, and nearly £600,000 accrued from residuals alone. If they went on in this way the time would come when they would be getting gas for nothing. Public ownership, which meant nationalization, was the thing of to-day and to-morrow.

Treasurer Murray said they were dealing now with gas, although perhaps to-morrow it would be the transport and electricity undertakings. Their sound gas undertaking, which fell, and rightly so, under public ownership over half-a-century ago, had never faltered in its progress. While each year the capital expenditure had risen until it topped to-day the figure of £3,500,000, the outstanding debt had considerably been reduced to the figure of £600,000. The consumption had risen to the record sale of 4,761 million cu.ft., and the revenue had risen to over £1,000,000.

What better form of public ownership was there than that of the municipality, especially where the municipality could show a progressive ownership and a preparedness to extend the service both within their own area and to meet the needs of adjoining localities? In England the bulk of the gas was provided by private companies, whereas in Scotland the position was completely reversed, with 86% of the gas supplied by the local authorities. The four cities in Scotland sold 60% of the gas consumed. Why then a different form of public ownership, why transfer from the local authority to Government authority? "I cannot see any justification for Scotland being pulled at the heels of England and made to hand over those municipal assets."

In England and Wales a very substantial capital sum had been put in by private companies. In Scotland 98.42% of the capital issued or borrowed had been provided by the local authorities, and 1.58% by companies. It had been suggested that the companies would be compensated for the changes of ownership, but this was not so with the local authorities. In England there would be general satisfaction from the companies who provided 70% of the gas, and who would be compensated on a figure based on over £102,000,000 of capital issued or borrowed. What satisfaction was there to be to Scottish local authorities supplying 86% of the gas and getting no compensation for over £17,000,000 of the capital involved in the undertakings? The position in Scotland was such that the desires of the Government for public ownership were already achieved.

Coal Reserves and Production

In the past there have been many assessments of our national coal reserves, notably those of the Royal Commissions reporting in 1871 and 1905. Recently a novel addition to the literature on the subject has been made. The Fuel Research organization of the Department of Scientific and Industrial Research has issued a first appraisal of the results of a rapid survey of coal reserves and production. The report* frankly avoids any attempt to assess total reserves, but concentrates on those readily available reserves that will probably support output for the next 100 years. This contribution is unique because these reserves have been classified for each coalfield into kinds or types of coal. We have now, for the first time, some data on the relative proportions of anthracite, coking coal, gas coal, &c., in our immediately available resources.

Since much of our total reserves is, as yet, not definitely proved, the process of classification could not have been applied to the total. The continued field work and analysis will keep our knowledge of the nature of our reserves well ahead of actual production.

The report deals with the properties of 20,000 million tons of coal as yet in the ground, and in passing, certain references are made to a further 15,000 million tons that have been noted whilst collecting the main data. This means, broadly, that so far as the classification of reserves is concerned we can to-day see our way clearly for 100 years and for a further 75 years somewhat less clearly.

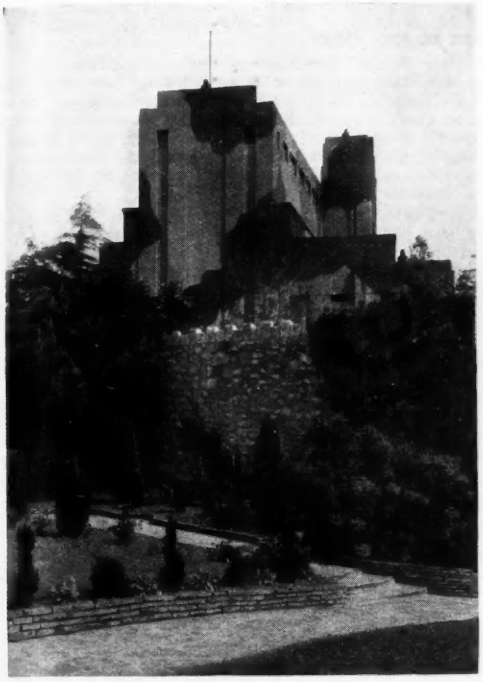
The general position revealed by this report gives no cause for alarm. The reserves of the various kinds or types of coal appear to be adequate to meet the demands, barring any revolutionary changes. Attention is called, however, to the approaching depletion of our reserves in certain special areas. For instance, in the section dealing with Durham the report says: "The area with the shortest life—less than 50 years—is almost exclusively confined to West Durham, which produces coking coals"—*i.e.*, medium-volatile metallurgical coking coal. Later we find, however, regarding Durham as a whole, that "long after the medium-volatile coals of Durham have been exhausted, the field will produce coals similar in type to the best coals now used in coke ovens in the Midland areas."

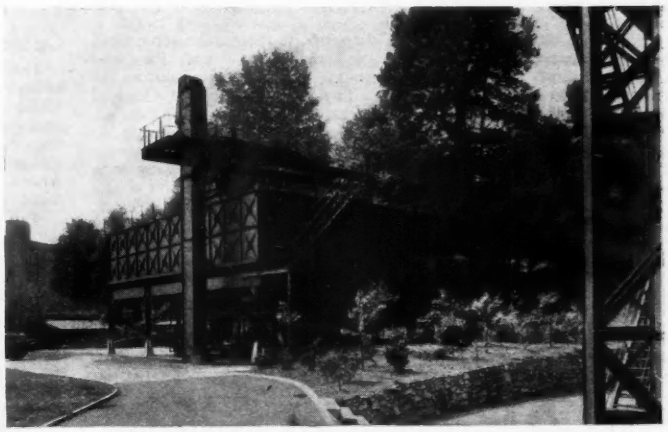
Attention is called to the remarkably wide range of coal types produced and available in South Wales. Some of these types are found in Kent as well, but apart from those two coalfields the low-volatile coking and steam coals cannot be obtained elsewhere. The reserves in Kent are very conservatively estimated, but the position there is discussed in some detail.

Three-quarters of the reserves classified consist of general purpose coals such as those mined in Lancashire, the Midland area, Northumberland and Scotland. To quote the report: "The great virtue of these coals lies in their adaptability . . . the whole range is suitable for domestic use, gas making, steam raising and for general industrial purposes." This answers the question which is often raised regarding supplies of particular types of coal. Commenting on the present position the report says: "At times of low output . . . the shortage of coal is felt by the carbonizing industries, in common with others, even though the output of gas and coking coal is still more than adequate."

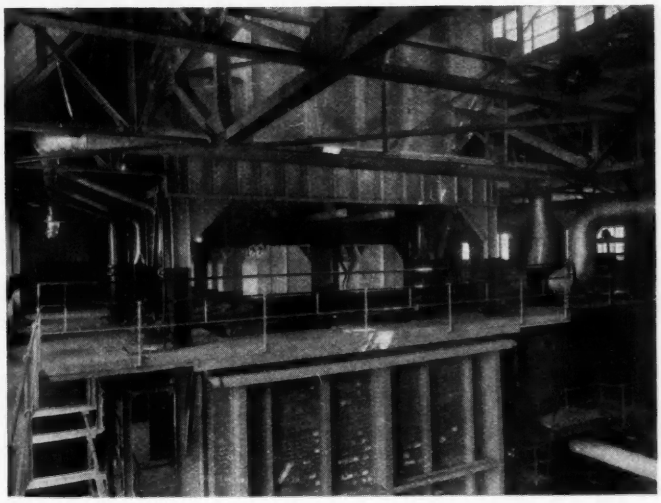
* H.M. Stationery Office, Price 9d. net.

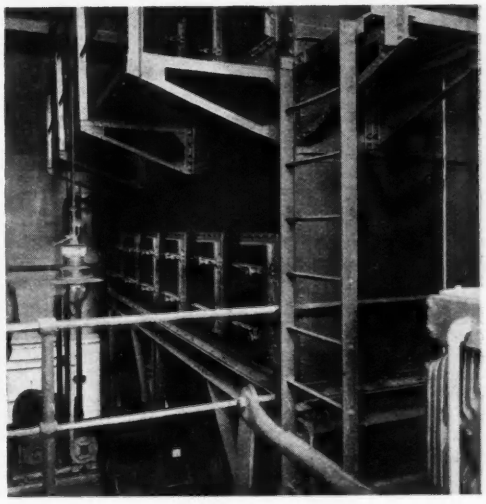
The Gas-Works Beautiful





Our photographs are of the Torquay Gas-Works, visited recently by the Western Junior Gas Association. It will be apparent from these excellent views that the Torquay and Paignton Gas Company, of which Mr. R. C. Taylor is Director, Engineer, and General Manager, have made every effort, and with very great success, to make their works highly attractive and the working conditions for the men employed extremely pleasant. These works are, in fact, a shining example of what can be accomplished. The top photographs show (left) the South elevation of the retort house and (right) the overhead purifiers. The lower photographs are, on the right, of the ducting system to ensure cool and pleasant conditions for the operators (cold air douche); and, on the left, of the coke dust extraction plant. The disposal of the coke dust from this pre-eminently clean works is the subject of a special article on later pages of this issue of the "Gas Journal."





Western Juniors

The Summer Meeting of the Western Junior Gas Association was held at Torquay on June 29, when there was a record attendance of some 75 members.

Mr. R. C. Taylor, Director, Engineer and General Manager of the Torquay & Paignton Gas Company, welcomed members, and after being entertained at a buffet luncheon the guests inspected the works. It was the opinion of the members that they had been privileged to see one of the cleanest and best maintained gas-works in their experience.

During the afternoon a motor coach tour had been arranged, the route including Ashburton, Holne Chase, Poundsgate, Forest Tor, Dartmeet, and Buckfast Abbey. This route is generally considered to include the best moorland scenery in Devonshire. Tea was provided at the Seymour Hotel, Totnes, the party finally disbanding at the Torquay Gas-Works. A hearty vote of thanks was proposed to the hosts for their hospitality by Mr. J. T. Davies (Bath), seconded by Dr. A. Marsden (Bristol). Mr. J. W. Denton, Assistant Engineer to the Torquay Company, responded.

Diary

July 18.—B.G.C. North Western District Meeting, 2.15 p.m., Gas Department Theatre, Manchester.

July 18.—Solid Smokeless Fuels Federation.—Executive Committee, 11.30 a.m., Dorchester Hotel, London, W.1.

July 19.—B.G.C. Midland District Meeting, 2.15 p.m., Grand Hotel, Birmingham.

July 22.—B.G.C. South Wales District Meeting, 2.30 p.m., Gas Offices, Bute Terrace, Cardiff.

July 23.—B.G.C. South Western District Meeting, 2 p.m., Imperial Hotel, Exeter.

July 25.—B.G.C. Eastern District Meeting, 2.15 p.m., Gas Industry House.

July 26.—B.G.C. London District Meeting, 2.30 p.m., Gas Industry House.

July 30.—B.G.C. Scottish District Meeting, 2.15 p.m., City Chambers, Edinburgh.

July 30.—Domestic Development Committee, 2.30 p.m., Gas Industry House.

July 31.—Domestic Development Committee: Technical Sub-Committee, 10 a.m., Gas Industry House.

Mobile Briquetting Plant

For some time the problem of disposal of their coke screenings has been exercising the minds of the Torquay and Paignton Gas Company and about two years ago, with briquetting in thought as a solution, Mr. R. C. Taylor, Director and General Manager, after preliminary investigation, conceived a design incorporating a number of new departures in plant design to combat the hitherto deterioration of briquetting plant elements when exposed to coke dust, and to overcome the inconvenience of bringing coke dust from the various sites in his works on which it had accumulated, to a single stationary plant. Here, in brief, was the problem: An acceptable plant would need to be fully mobile, capable of operation wherever it could be supplied with electrical energy; its elements must be dust-tight wherever practicable, or have the greatest possible resistance to abrasion where necessarily exposed. To make the operation economic the plant must be as nearly as possible automatic in operation, simple to control, and require the minimum of operational labour.

Messrs. Robert Cort & Son, of Reading, were commissioned by Mr. Taylor to supply such a plant to his design and to the specifications of Mr. Frank F. Tapping, a Consulting Engineer of many years' experience in fuel briquetting.

The production of a plant of such specialized design under the existing industrial conditions naturally met with considerable delays, and the delivery and starting up of the plant coincided with the 1946 Summer Meeting of the Western Junior Gas Association, at Torquay, on June 29.

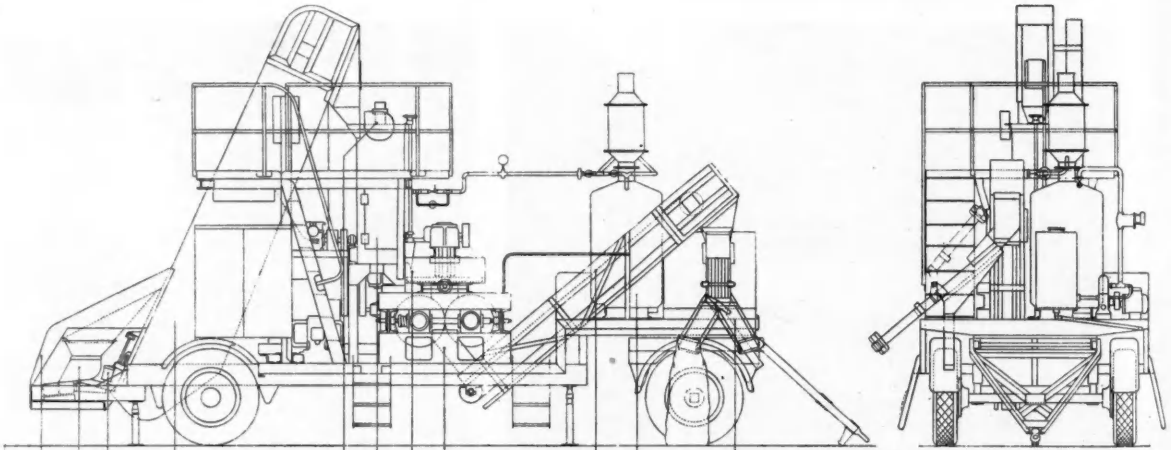
The initial results observed by the 80 members of the Association impressed them with the effective operation of this compact plant, and Mr. Taylor is to be congratulated in achieving in practice continuous and automatic operation with the delivery of a uniform, highly finished product.

Operation of the Plant

The Mobile Briquetting Plant is an electrically-driven, self-contained unit, mounted on a dropped-frame, pneumatic tyred trailer, and is suitable for use where, as in the case of Torquay and Paignton Gas Company, the coke dust is accumulated in more than one dump, so that mobility of the briquetting plant minimizes the handling of the dust, as well as among neighbouring works whose individual outputs of fines would not provide full employment for a stationary plant.

The plant is designed for a continuous production of briquettes of optional size and shape from a previously ground minus $\frac{3}{16}$ in. mixture of coke screenings with 9% to 10% of medium-soft briquetting pitch at a production rate of from one to three tons per hour at the choice of the operator.

The prepared mixture is fed to a receiving hopper fitted with a wire-mesh grid for the exclusion of oversize material and discharging to an electro-mechanical vibrating feeder controlled by an infinitely variable rheostat for fine setting, to allow for variation in fluidity of the mixture. For removing tramp iron a permanent magnet is suspended over the feeder chute down which the mixture passes to a standard-type bucket and chain elevator running at constant speed and arranged to discharge into the top of the vertical fluxer. This fluxer is fitted with a vertical shaft carrying a series of horizontal agitators and an extruding footpiece and is supplied through four jets with steam from a small vertical boiler mounted on the forward platform of the vehicle. The boiler is equipped with a specially designed chimney superheater which permits the temperature of the injected steam to be regulated to suit the moisture content of the mixture being briquetted. Under the combined influence of mechanical agitation and heat from the injected steam, the mixture is converted to a



1. *Feed Hopper and Grid.*
2. *Electro-mechanical Vibrating Feeder.*
3. *Permanent Magnet.*
4. *Bucket Elevator.*
5. *Limit Switch.*
6. *Fluxer.*
7. *Cooling Pan.*
8. *Roll Press.*
9. *Belt Conveyor.*
10. *Bifurcated Bagging Chute.*
11. *Boiler.*
12. *Superheater.*
13. *Boiler Pump and Water Supply Tank.*
14. *Automatic Water Supply Control.*
15. *Trailer.*
16. *Cable Reeling Drum.*

stiff-plastic paste which passes at a controlled rate from the base of the fluxer into the cooling pan, which is fitted with stirring arms and a screw-operated door, through which the mixture passes to the press rolls. The moulded fuel emerges from the press on to a 12 ft. inclined belt conveyor up which it passes to the head of a 1 in. bar screen mounted on the forward platform. In passage over this screen the moulding fins are removed for retreatment, while the cleaned briquettes pass down a bifurcated chute the branch outlets of which are arranged for supporting the bags, which are alternately filled.

Among the novelties in design and outstanding features of this modern briquetting plant, the following might be specially noted :

Control of Feed and Flow

The vibrating feeder, which has a manually operated rheostat for fine setting, is independently governed by a limit switch mechanically operated from the fluxer. By this means the working level in the fluxer, and hence the time of mixing, are automatically stabilized, thus ensuring the production and delivery to the press of prepared briquetting mixture which is uniform in temperature, moisture, and plasticity.

Roll Press

Patented improvements embodied in the rolls of the Tapping press installed at Torquay comprise cast iron hubs to which are secured peripheral rings of interchangeable half-mould segmental plates, each of which constitutes a row of three half-moulds.

As opposed to any expense and time involved in renewing a pair of worn or damaged solid rolls, individual mould plates of the Tapping press which may have become damaged can be removed and replaced with new in a matter of minutes' stoppage of the plant, while when their moulding surfaces have become so worn as a whole as to be unserviceable, the rolls can be put into new condition in about two hours' working time by fitting a complete new set of 60 interchangeable mould segments. We are informed that no dismantling of the plant other than unclipping the worn moulds is involved in this renewal ; no subsequent adjustment or running-in of bearings is required ; and production can be resumed immediately.

Because of the small unit size employed in this form of roll construction, the moulds are produced in extremely hard alloys and conveniently heat-treated and precision finished. Also, where desired, the moulding recesses are vitreous enamelled. A new forming process for dealing with refractory alloys now under investigation promises a mould of greater resistance to abrasion than has hitherto been possible. A free replacement service of interchangeable moulds up to a guaranteed tonnage throughput of fuel is provided.

Briquettes varying in weight between one-quarter of an ounce and two ounces can be produced at will in the same press and at short notice by changing one set of moulds for another of the size and form desired. The driving gear has been designed to give a choice of three speeds to the press and conveyor, enabling the operator to obtain, by setting the speed regulator, a throughput of one, two, or three tons per hour of briquettes, when dealing with raw material weighing approximately 40 lb. per cu.ft. The overall dimensions of the plant are : Length 24 ft., width 7 ft. 6 in., height 14 ft. 5 in. above roadway. The complete plant, which weighs approximately 11 tons, including vehicle, operates on a consumption of approximately 3 h.p. when running empty and 5 h.p. when fully loaded on a 1 ton/hr. throughput.

The suppliers of the plant, Robert Cort & Son, in association with Tapping & Co., of South Ash Manor, near Wrotham, Kent, are establishing works for the production of fully standardized mobile plants as well as stationary installations for any tonnage, designed to suit individual requirements ; and we understand that reasonable deliveries, having regard to prevailing industrial conditions, can be offered.

Coke Dust Briquetting Plant

Extensions at Stoke-on-Trent

Extensions to the Etruria works of the Stoke-on-Trent Gas Department, made necessary by the increasing demands of industry and domestic consumers in the area, were officially inspected by members of the Stoke-on-Trent City Council and other prominent citizens on July 1, on the inauguration of the first section of the new carbonizing plant. Some years ago the Gas Committee, anticipating that demand would increase, prepared a comprehensive scheme of extension to enable the works at Etruria to produce an extra 6,000,000 cu.ft. of gas per day.

A 2,000,000 cu.ft. per day Glover-West continuous vertical retort plant, new condensers, washers, electrostatic detarrer and exhausters were brought into production in February of this year, and work is now proceeding on the second part of the vertical retort plant, which it is hoped to bring into production before the end of the year. Work is also proceeding on a 5,000,000 cu.ft. waterless gasholder. The foundations for this were laid at the beginning of the war, but owing to hostilities no further progress was then made. The undertaking in the past has been short of holder capacity—at present it is only equal to 13¾ hours of the maximum day's delivery—so this new holder will fulfil a long felt want. It will embody many improvements and refinements discovered in recent years.

The erection of a new 8,000,000 cu.ft. per day oxide purification plant, on land near the works, is going ahead as the present purifiers will be overtaxed when the complete carbonization plant comes into operation.

The growth of the carbonizing plant has had its effect on the chemical works, and it has been necessary to put down a new benzole rectification plant capable of dealing with 9,000 gallons of crude benzole per week.

The carbonizing plant is designed for a daily capacity of 6,000,000 cu.ft. The retort house, when complete, will contain three benches in line, each with 24 Glover-West continuous vertical retorts. One of the benches was completed last year, together with coal and coke handling machinery capable of serving the whole installation. The other two benches, with the coke screening plant, will be completed during the current year.

The scheme also includes two Holmes-Elex electrostatic detarrers, each capable of removing tar fog from 6,000,000 cu.ft. of gas per day, with an extraction efficiency of 99% to 100%. The three exhausters on the new gas stream are of the Holmes Connersville twin-impeller design. Two of the exhausters each have a capacity of 250,000 cu.ft. of gas per hour, against a differential pressure of 54 in. water gauge, and the third machine has a capacity of 187,000 cu.ft. of gas per hour. Two static ammonia washers have recently been installed, each having a capacity of 6,000,000 cu.ft. of gas per day.

The Department recently acquired land on the northern side of the main Etruria works, on which an installation of dry oxide purifiers capable of dealing with 8,000,000 cu.ft. of gas per day is now in process of erection. Provision has also been made for a Holmes-Connersville meter to be installed in a meter house at the Etruscan Street end of the new purifiers, and land has also been purchased at the southern end of the works, with a view to further extensions when they become necessary.

The Lord Mayor, who is Chairman of the Gas Committee, officially inaugurated the first section of the new vertical retort and the new washing and exhausting plant, unveiling the control panel of the latter. After the inspection, tea was served in the Works Canteen, Mr. G. L. Barber presiding.

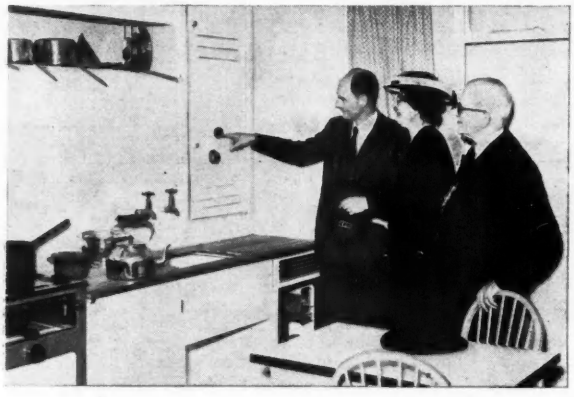
Welcoming the visitors, the Lord Mayor paid tribute to two of his predecessors as Chairman of the Gas Committee—Mr. A. E. Hewitt and Mr. A. Pemberton, who, he said, held office while the great extensions were being planned.

The gas-works, the Lord Mayor said, were serving an area of 89¼ square miles, with a population of 280,000 and about 70,000 consumers. The Gas Committee took pride in the fact that the sales of gas, both for industrial and domestic consumers, had reached record figures. Household consumption had increased by more than 50% since 1939 ; while industrial demands would be realized by the fact that only 7,500,000 cu.ft. of gas was used for pottery firing in 1932, compared with 1,485,000,000 cu.ft. in 1946.

Model Kitchens at Portsmouth

On Monday, July 1, the Portsmouth and Gosport Gas Company gave a luncheon at the Queen's Hotel, Southsea, on the occasion of the official inspection of the British Gas Council's Home Planning Exhibition at the showrooms of Messrs. A. W. White and Company, Portsmouth.

Mr. W. K. TATE, General Manager of the Portsmouth and Gosport Gas Company, proposing the health of the guests, said he was happy, in the name of his Company and its Chairman and Directors, to welcome so many people notable in the civic life of Southern England. He referred to the importance of planning towns in which people are to live. The impressive Exhibition at Dorland Hall was found too cumbersome to take round the country, so it was decided to construct a smaller edition to visit twelve centres, and the Portsmouth and Gosport Gas Company had the honour to be allowed to present it to the people of Southern England. The model kitchens were designed as far as possible to incorporate all modern improvements, and unlike the Dorland Hall Exhibition, all the appliances were on the market at the present time.



Mr. W. K. Tate, General Manager of the Portsmouth and Gosport Gas Company, describing appliances to The Worshipful the Lord Mayor and Lady Mayoress of Portsmouth at the Home Planning Exhibition on July 1.

In response, Alderman A. E. ALLAWAY, the Lord Mayor of Portsmouth, said that he was sure the guests were one with him in seeking information for the betterment of the work which had to be done in the future. He agreed with Mr. Tate that the kitchen was the workshop of the home, and gas was ahead of electricity in bettering this, as cost had to be borne in mind when planning. It was useless to install the latest equipment for tenants who could not afford the cost of running it.

Councillor R. J. STRANGER, the Mayor of Southampton, also responded. He was glad to see that all the Mayors present at the luncheon had brought their wives, as their advice was the best concerning kitchen equipment, and he was therefore glad to see women represented more on Town Councils and Housing Committees.

In proposing the toast of the Gas Industry, Councillor R. H. OLD, the Mayor of Bournemouth, said it was impossible to over-emphasize the immense debt they owed to the Gas Industry, not only in connexion with its research but also on the administrative side. He felt very strongly that the Industry had shown its ability to organize itself, and should be left without the controls now suggested.

Mr. S. E. WHITEHEAD, Chairman of the Southern Region Gas Council and Managing Director of the Southampton Gaslight and Coke Company, thanked Councillor Old for his compliments to the Gas Industry, and extended the thanks of the British Gas Council to the Portsmouth and Gosport Gas Company for their enthusiasm, hard work, trouble, and expense in organizing the Exhibition. He wished to state that the Council and the vast majority of the Industry was totally opposed to nationalization, and it was quite unnecessary, as the Industry had always been controlled as to profits, dividends, and quality of gas. Nationalization could do no more for consumers, employees and shareholders than the Gas Industry would if left to carry out its own post-war plans.

After the luncheon the guests adjourned to Messrs. Whites' showroom and inspected the model kitchens.

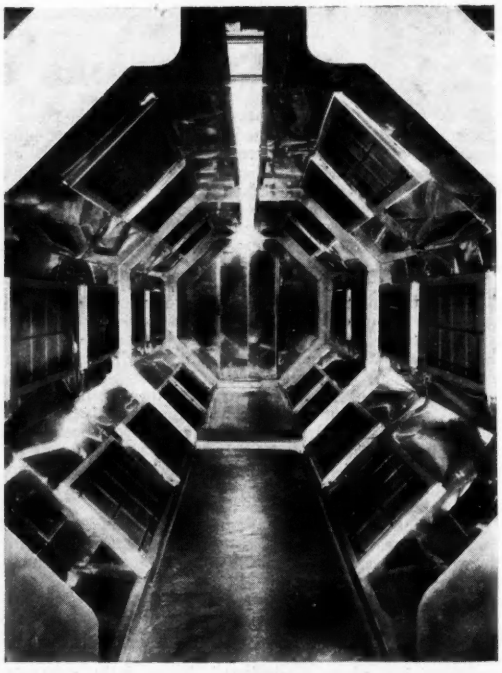
Sulzer War Record

During the past few months we have published accounts of how several firms answered the nation's call to arms. There is, as yet, little sign of slackening in the flow of such stories, and we are now able to add the name of Sulzer Bros. (London), Ltd., to the growing list. A lavishly illustrated brochure describes the many articles manufactured by this firm which have contributed heavily towards our victory.

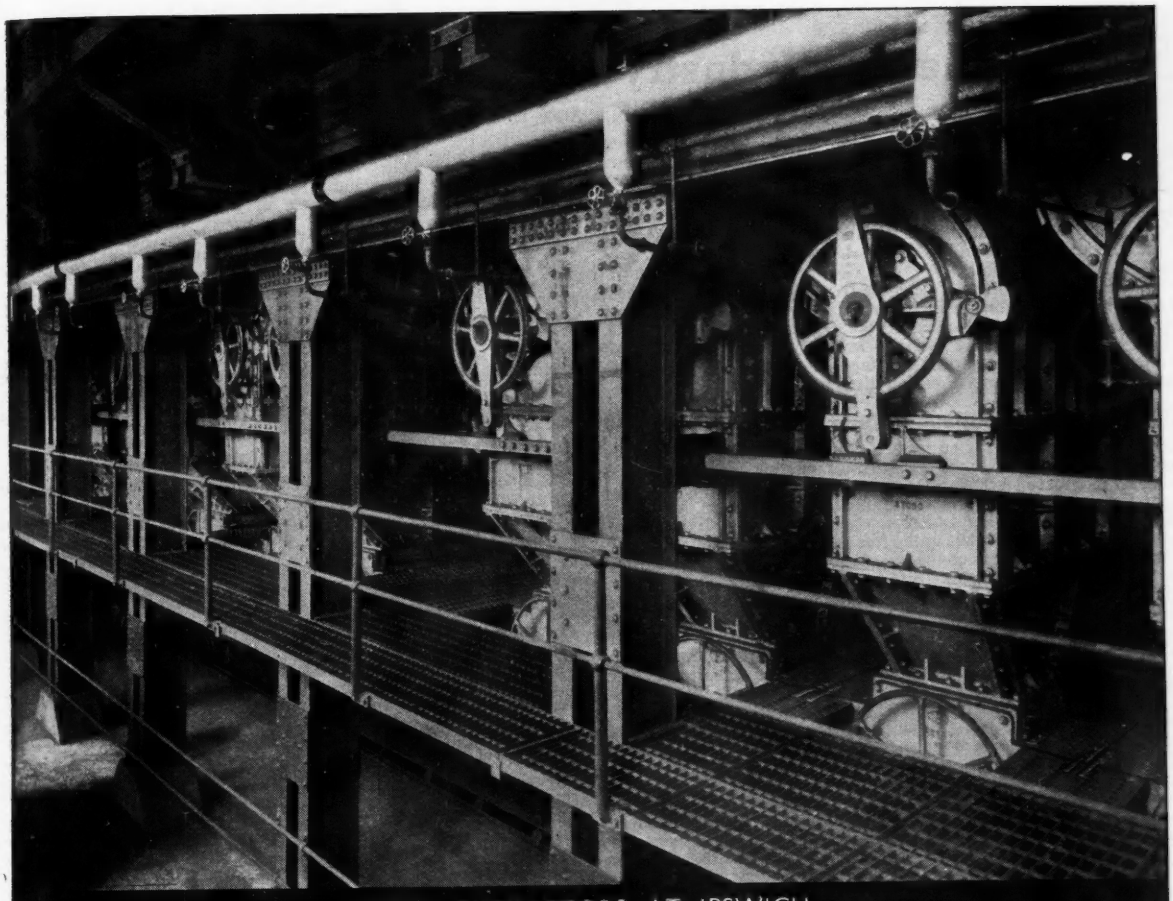
In 1937 the Government began to build up a supply of fire pumps against a national emergency. Until 1945, Sulzer Bros. (London), Ltd., manufactured various types of these machines. Some were designed for use upon lorries, barges, fire floats, and foundations, and were powered by Ford V8 engines, while others were of the borehole type and capable of replenishing static water tanks and dams. Many of the usual trailer fire pumps were also made. Other types of pumps included mobile hydraulic pumping units for use if hydraulic pressure installations controlling dock gates, bridges, and cranes should be damaged, and field service pumps for use by the Army. On a larger scale were the pumping installations for land drainage which were widely used by war factories and aerodromes. Coalfields in this country and in Russia were equipped with sinking pumps to restore them to a workable condition following damage. Another sort of pump concerned with mines is a pump produced to clear land-mines from our coasts, placed there as an invasion precaution. The surface layers of the beaches are washed away with jets of high pressure water which expose and detonate the mines. Many pumps were supplied to the Government for water heating for factories and Sulzer pumps played an important rôle in the much-lauded Operation FIDO.

Another field in which the firm is justly famed is that of welded tubular pipe work. At the Royal Ordnance Factory, Sellafield, Sulzer Bros. (London), Ltd., fabricated and erected 200 tons of tubular pipe gantries and a 170 ft. footbridge. At the request of the Ministry of Supply 9,000 tons of Bailey bridge components and 2,000 tons of "V" trestling bridge components were manufactured. For radio communication 50 special towers were made which could be lowered when necessary, and 60 further towers were manufactured for artillery observation. During the years 1942-45 no less than 12,000 tons of steel sections were handled.

Inside Information



An interesting photograph of the interior of one of the 24 unit Gas-heated Infra-Red conveyor ovens now being constructed by Messrs. Thomas Potterton (Heating Engineers), Ltd. So great has been the response since their introduction to industry that Potterton's have set aside a portion of their Wandsworth Works for mass production of these units.



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The Gas Industry in France, 1939-1945*

By P. MOUGIN† and J. THIBAULT‡

THE difficulties experienced by the Gas Industry in France during this first period of the war, extending from Sept. 2, 1939, to the invasion of French soil in May and June, 1940, appear to-day, after the passage of six years, as very slight. Sufficient simply to say that these difficulties arose primarily from the disorganization caused in gas undertakings by the mobilization of 18,000 of their personnel.

Whereas some gas-works near the frontier in the North-East of France had to let down their retorts, following the evacuation of the inhabitants, others, situated in reception areas for these people, found their consumption soaring abruptly. From the end of September, 1940, the growing shortage of fuels led to the formation of the first organization for distributing coal and coke.

The Period of Occupation: June 1940, to August 1944

When in July, 1940, after the first confusion was over, gas staffs returned to their works, the gaps were numerous. Out of 18,000 persons mobilized, 6,000 were prisoners. Although the installations for the production and distribution of gas had, on the whole, been spared, the damage caused by bombing and military operations totalled roughly 80 mill. francs. The disorganization of transport and the exodus of the population had entailed the closing of the majority of gas-works, including those in the Paris region. Of 749 works, 25 were never to re-open. In some cases, the mains were coupled to an adjacent feeder; in others, where conditions proved prohibitive, distribution was simply suspended. Other victims of circumstances, the propane distributing stations, which had promised so bright a future, were also forced to suspend their activities. Nevertheless, gas engineers, their hearts filled with sadness, applied themselves anew to their work; but the real difficulties were only just beginning.

The inadequacy of the coal allocations soon made itself cruelly felt, and it was only through the efforts and ingenuity of works managers, who strove by every possible means to limit their fuel requirements, either by increasing to the maximum the yield from their retorts, or by the use of substitutes, such as lignite, wood, peat, or even olive bark, that many homes in France were not completely deprived of gas. From October, 1940, the calorific value suffered its first reduction to 450 B.Th.U. per cu.ft. and, at the same time, the first steps had to be taken to restrict individual consumption by threatening penalties and disconnexion of supply. The new classic methods of reducing calorific value by steaming or by addition of water gas or producer gas to coal gas, became general, and the majority of provincial undertakings were compelled to limit gas distribution to a few hours per day, at meal times.

In addition to difficulties caused by the shortage of coal, others soon began to make themselves felt, due to the progressive exhaustion of stocks of all sorts of raw materials and to the ever increasing appetite of the occupying authorities. After the beginning of 1941, it became practically impossible to procure any kind of industrial product without first obtaining a docket, allocation permit, or some other form of voucher. The earliest allocation departments had just been set up and, in addition to their functions as distributors, these bodies, usually under enemy pressure, drew up increasingly lengthy lists of "prohibited uses." Thus, from April, 1941, lead, aluminium, zinc and copper were virtually prohibitive to our Industry. When it is remembered that the majority of services and interior installations in France are made of lead, it will be realized how unpopular these measures were at the time.

Coal Allocations

Thanks to the understanding of the French distributors, the quantities of coal allocated to the Gas Industry up to 1944 remained appreciably constant. Nevertheless, the ever growing requirements of the occupier, who sought to make French industry operate almost exclusively to his own profit, compelled gas engineers more and more to increase their yields in order to make available to French households the few cu.ft. of gas necessary for cooking their food.

It will not be without interest to give some statistics which, better than any long report, recall the story of the period from 1938 to 1944. It should be noted that the figures quoted for 1941 to 1944 do not include the three departments of the Upper Rhine, Lower Rhine and Moselle, which were brutally separated from France by the invader in July, 1940. The tonnages of coal used during this period were approximately as shown in the following table. The volumes of gas made during the same period at gas-works alone (excluding gas supplied from coke ovens) and the corresponding average yield of gas per ton of coal are also shown.

Year	Coal Used (Thou. tons)	Gas Made (Mill. cu.ft.)	Yield of Gas (cu.ft. per ton)	Coke for Sale (Thou. tons)
1938	3,700	59,833	16,171	1,749
1939	3,730	57,009	15,284	1,789
1940	3,337	53,762	16,111	1,503
1941	3,359	64,281	19,137	1,383
1942	3,490	69,047	19,782	1,306
1943	3,456	70,565	20,418	1,227
1944	2,045	51,891	25,375	462

In some works the yield reached as much as and even exceeded 35,000 cu.ft. of gas per ton of coal. Obviously, these steadily rising yields of gas were obtained at the expense of coke available for sale, the figures for which are included in the table.

Substitute Motor Fuels

But let us leave these detailed statistics in order to say a few words on the very important part played by our Gas Industry, during this war, in the production of substitute motor fuels. This was all the more important, since these substitute fuels were practically useless to the enemy for military purposes.

From the earliest days of 1941, two companies were formed, with the support of gas undertakings, for the construction and use of compressed-gas distributing stations. In spite of the growing dearth of metals and materials of construction, stations were rapidly set up in the principal French towns and, in fact, more than 200 such installations are in operation. In 1940, the necessity of equipping with the utmost speed 400 to 500 vehicles led the company which operates the omnibuses in Paris and its subsurbs to utilize uncompressed gas on an extensive scale. The system of a gas bag placed on the roof and supported by a light framework was adopted, and if, at first, Parisiens joked about the sudden increase in size of their 'buses, it was considered, in the long run, by both suppliers and users, that the solution was a happy one and should be continued. Concurrently with the erection of distributing stations for gaseous motor fuel, and with the adaptation of the Paris 'buses to use uncompressed town gas, our Industry was called upon to contribute, in another direction, to the solution of the transport problem by developing the use of coke in mobile producers. From 1942, 50 gas-works, scattered throughout 45 departments, were equipped for the production of 1,200 tons per month of special coke ("gazocoke").

After the 1940 Armistice

After the general exodus of 1940, and the cessation of hostilities on our soil, many Frenchmen had the impression that the war had become remote from them. Nevertheless, the ever increasing uncertainty of transport and the possible resumption of bombing, inspired gas engineers to combine in studying all possible means of minimizing the effects of the war. Following the armistice, the small works in the Paris region had developed a plan for a vast interconnecting network of mains, the realisation of which was, in the end, to prove so valuable. Later, assistance squads were set up in all the larger works with a view to bringing rapid help, not only to some point in their own distribution system, but equally to a damaged supply system in the neighbourhood.

In 1942, a fortunate event occurred to afford appreciable assistance to the distributors of gas in the Toulouse region. Instead of petrol, the early borings at Saint-Marcet placed at the disposal of gas engineers in that region increasingly larger volumes of methane which, in these times of coal shortage, received a welcome that can be imagined. The result obtained was all the more remarkable in view of the fact that the work had been voluntarily restricted by the French Authorities in the fear that the petrol would be requisitioned immediately by the Germans.

But the comparative quiet of the year 1941 did not last long. In 1942, the bombing of enemy targets in France was resumed. The gas-works at Lorient and Saint-Nazaire, which were almost completely destroyed, were the first to have to cease operating. The works at Brest, quite close to the naval port, were repeatedly hit by bombs but managed each time to recover. Then, after the ports, it was the turn of inland targets and of railway marshalling yards, to be bombed. These bombings naturally caused damage, which was often considerable, to gas distribution systems as well as to the actual gas-works. The network of the suburban Société du Gaz, and the undertakings at Rennes, Rouen, Abbeville, Caen, Le Mans and Nantes were seriously damaged.

The calorific value of the gas had to be reduced successively, from 450 to 425 and, finally, to 395 B.Th.U. per cu.ft. in the early months of 1944. Hourly restrictions in gas supply became more

(*Continued on page 117.*)

*From "The Gas Industry Overseas: 1939-45." Communication No. 299 of the Institution of Gas Engineers.

† Delegate-General, Union Syndicale de l'Industrie du Gaz en France.

‡ Mining Engineer, Economic Council of the Syndicat du Gaz.

(*Continued from page 112.*)

and more general and, shortly before the Liberation, the periods during which the mains were under pressure were reckoned in minutes rather than in hours. It should, however, be noted that, in spite of bombing, transport difficulties, lack of maintenance, and removal of personnel, not a single gas-works was compelled to cease operating in March, 1944, through lack of coal. But, after that date, the redoubled intensity of air-raids made it physically impossible to supply with coal an increasing number of works. By June 6, 1944, the day of the Anglo-American landing in Normandy, some 100 gas-works had had to cease operating their retorts. Then, while hope was reborn in our hearts with the advance of the liberating armies, the bombing of works became more and more serious and frequent and, on the long-awaited day of Liberation, the majority of gas-works, including those in the Paris region, had been compelled once again to let down their retorts.

From the Liberation to To-day

After the hectic hours of the liberation of Paris, the battle that we had hoped for a moment to have been finally concluded had, in fact, simply moved on towards our eastern frontiers. When we made an inventory of losses and destruction we saw that the total was indeed a heavy one.

In spite of the terrible bombing and sabotage, the means of production had not suffered irreparable disaster. Out of 749 undertakings in action in 1939, 25 had been stopped in 1940 on account of the war and had not resumed operation, and 413 had been damaged between 1941 and 1944, 399 partially and 14 more or less completely. These 14 undertakings represent only 1% of the total production capacity. On the other hand, distributing installations in many places suffered serious damage, and a large number of gasholders were put out of action. Undertakings had also suffered in a general way from very inadequate maintenance and from the virtual suppression of new work, which materially reduced their practical production capacity. Finally, the continued lack of materials of all sorts, notably of meters, must be mentioned. In regard to personnel, however, there were no insuperable difficulties.

Once again, therefore, coal was the one problem which was really acute and upon which depended the resumption of production at the works. Immediately after the Liberation, production in France had shown a sharp fall and, in addition, transport was completely disorganized. During the whole of the latter part of 1944 it was impossible to do more than attempt to maintain in action the services and works which had not been brought completely to a standstill. In 1945, the situation remained very poor; during the first six months, production continued at about 65% of that pre-war, and imports covered only the needs of the Allied armies. Since June, however, a steady and fairly rapid improvement has set in; at the end of November production had reached 95% of that in 1938, and, to-day, it has reached practically 100%.

Supplies to the Gas Industry have followed a parallel course. From 104,000 tons of coal carbonized in October, 1944, the figure has increased progressively to 177,000 tons in January, 1945, reaching 305,000 tons in October, 1945. This represents about 85% of the coal carbonized in 1938. In contrast, the amount of gas made is 150% in actual volume, or, taking into account the reduction in calorific value, the thermal output is 120%. Coke for sale is hardly more than 50% and benzole production is only 44%.

Future of the Gas Industry in France

What is the future of the Gas Industry in France, and with what problems will it be faced?

It should be noted at the outset that, in spite of the greater volume of gas sold, certain very important demands remain unsatisfied. Factories using gas have developed greatly both in number and in consumption, partly because the efforts made by French gas engineers to make the use of gas practical and economical during the pre-war period are now bearing fruit and partly because the lack of coal and heavy oil during the war has broken down the inertia of a large number of users and has given gas a very important circle of new consumers. A very reasonable estimate of present potentialities leads one to believe that sales from gas undertakings in France may be doubled in the next 10 years.

Unfortunately, inadequate supplies of coal require the continuance of severe restrictions on the use of gas, for both domestic and industrial purposes. For domestic users, individual allocations are at present fixed according to the number of persons in the household and, although greater toleration is shown in regard to kitchen usage, heating by gas is still only permitted in proportion to the possible supply of coal to the population and as an alternative to the coal ration. The possibility of enrolling new consumers is prevented by lack of meters. In many towns, the gas supply is still confined to a few hours each day. Consumption for industrial purposes without permission from the Authorities, is entirely prohibited; such permits are given extremely sparingly. For example, in June, 1945, the authorities prohibited the use of gas by bakers in Paris, and it was only after extremely difficult discussions that it was possible to maintain a gas supply to one-half of them.

Clearly, the Gas Industry does not control its supplies of coal, the tonnage and quality of which continue to be fixed by the distributor. Neither does it control its own costs and charges; wages are fixed by the Government and are at present in the ratio of 4.35 : 1 by comparison with pre-war. In this connexion it is interesting to note that an agreement has been arrived at between the management and engineers, whose salaries follow proportionately any fluctuation in wages. The price of coal is fixed by the Price Control and is 3.3 times the pre-war figure, in spite of subsidies from the State. Selling prices of gas, however, can be raised only after lengthy proceedings with the Ministries of Industrial Production, of National Earning, and of Finance. They have been kept systematically at a level very much below that which would have been justified by increased costs; they are at present only 2.7 times the pre-war prices. The authorities have persistently refused to take into account the increased cost of renewals, and have generally granted increases in selling price with so much delay that most gas undertakings have operated at a loss for very long periods.

Concentration of Production

Finally, and this is perhaps more serious, the Gas Industry is not master of its destiny. It is, at the moment, subject to very strict administrative control which practically prevents it from undertaking any work of major renewal without the previous consent of the Administration. To be quite fair, it must be recognized that the latter at present shows a desire to encourage a large development of coal distillation in France. A Carbonization Committee has recently been appointed in the Ministry of Industrial Production to prepare a programme for this purpose. But the intentions of the Administration appear, at the present moment, to incline towards the concentration of production in very large coke oven plants which are complexes between the metallurgical, chemical and Gas Industries. The gas would be conveyed by feeder mains to the distribution systems. This idea, which is very attractive in a certain number of cases, does not appear capable of solving all the problems confronting the Gas Industry. On the other hand, the realization of these schemes will certainly involve long delays, and it is to be feared that, during this period, the work of renewal and extension will be held up: for the Gas Industry in France must without delay face very important new requirements, and it would be disastrous if it were not permitted to respond with all available means, imperfect though they might be, to the demands of consumers who, for the first time in France, are turning resolutely to the use of gas.

Parallel with the tendency, which is fairly general in France, to have recourse to coke ovens as large production units, it should be noted that the producers of metallurgical coke themselves, in particular the collieries of the north, have a very great interest in the development of their sales of gas to domestic and industrial consumers. The collieries wish particularly, at the moment, to dispose of large volumes of surplus gas from synthesis plants, having a calorific value of 650 B.Th.U. per cu.ft., density 0.7, and irregular quality, and which, therefore, are not particularly attractive to the distribution Companies.

Natural Gas

To complete this picture, emphasis must be laid upon the important part which the distribution of natural gas, discovered in July, 1939, in the south-west of the country, will be called upon to play in France. This gas, which emerges at a pressure of 150 atm. is almost pure methane and has a calorific value exceeding 1,000 B.Th.U. per cu.ft. The boreholes so far pierced appear already to be capable of yielding about 34 mill. cu.ft. daily for several decades. There are probably similar sources in neighbouring regions. This, therefore, represents an extremely important source of gas. Existing installations are capable of supplying 6.35 mill. cu.ft. daily, and it is planned to increase their capacity to 14 mill. cu.ft. and eventually to 28 mill. cu.ft. daily.

In conclusion, the resumption of oil refining in France is calculated to provide an important supply of propane, the utilization of which may perhaps be more rational than it was before the war, in accordance with methods similar to those which have been put into operation in the United States of America.

Thus, the French Gas Industry is faced with tasks which are very varied, very difficult, and very urgent. It is unfortunately in this critical period that the threat of nationalization has come to inflict profound uncertainty upon the Industry. The Gas Industry is emerging from a time in which it has proved itself capable, under the most difficult conditions of facing up to all the responsibilities which are placed upon it. In spite of this atmosphere of uncertainty, a recent enquiry made by the Syndicate as to the plans of undertakings in regard to temporary arrangements for meeting the anticipated sudden increase in the demand for gas, has received a very gratifying reception, since it shows how great is the interest taken by the undertakings in this particularly serious and urgent question. It remains only to hope that the major disputes of the present time will soon be settled so that it may be possible, with the return of peace and quiet, for the results of our labours to be both lasting and fruitful.

D

Question and Answer

Being the final article of our series giving a full report of the "Question Time" session at the annual meeting of the Institution of Gas Engineers. Other articles appeared in last week's "Journal" and in our issue of June 26.

Pressure at Meter Inlet

What is considered to be the desirable maximum working pressure which should be operated at the inlet of consumers meters where service governors are not fitted?

Mr. **J. T. Haynes** (Bournemouth): It is not clear whether this question has been asked in order to provide an opening for a discussion on the merits of service governors and appliance governors, or whether it has been submitted in order to obtain information regarding the gas pressures necessary with modern installations in domestic premises laid in conformity with the new Codes of Practice and the post-war Building Studies (No. 6) of the Ministry of Works. It has probably been submitted by one of the many unfortunate engineers who have inherited from their predecessors the results of the policies dictated by gas lighting only, and who now have to deal with internal piping in domestic premises wholly inadequate for the greatly increased consumption with gas heating appliances now so generally used.

Without knowing the number of appliances likely to be in use at any one time, or the condition of the installation pipes in a consumer's premises, it is difficult to generalize with regard to the maximum working pressure which should be operated at the inlet of the consumer's meter. On the other hand, there is the necessity for an adequate pressure at every piece of apparatus, and on the other, there must be safety limits in cases where both the gas meter and the house pipes have been in position for many years. From the point of view of safety in old installations a maximum of 4 in. w.g. at the meter is recommended. A pressure of 4 in. is also considered to be sufficient for modern installations laid in conformity with the new Codes of Practice.

It is appreciated that in many cases a pressure of 4 in. at the meter would be quite inadequate in old installations which now have to supply gas fires, water heaters, &c., and in these cases the limit might be raised to a maximum of 6 in. w.g., although I have known cases where as much as 12 in. had to be carried at the works governors in order to get any gas at all to the outer limits of the district, and premises near the works got the full benefit of 12 in. pressure, without any serious results.

It is generally accepted that the ideal to be aimed at is constant pressure and constant composition of the gas at the point of combustion. Constant pressure can be maintained only by installing an appliance governor on every piece of apparatus. This involves considerable initial cost, but in the experience of the Bournemouth Company over many years, this and the cost of maintenance is more than justified by the consumer satisfaction achieved.

For those who must have something cheaper, arguments can be found in favour of service governors at the inlet of the meters, instead of individual appliance governors. If, however, the distribution system is of adequate capacity, somewhat similar results can be obtained by means of feeder mains and district governors.

The short answer to the question, therefore, is 4 in. w.g., but I would again emphasize the advisability of fitting an appliance governor on every piece of apparatus throughout the area of supply, or at least a service governor on every service.

Meter Accuracy

Mr. **F. T. Buist** (South Suburban Gas Company): It seems to me that in this question we link up the question of variation of pressure as well as that of maximum pressure. One can imagine a district developing, and the engineer considering how much more pressure he can load on to a low-pressure main, whether he can go to 8, 10, or 20 in. at the works. There is a limit to what the consumer will stand for. Mr. Haynes has mentioned that a pressure of 12 in. has been used without serious results. I do not think that is quite what I should call good service; we should not wait for serious results. It is more a question of how far we can increase the pressure on a consumer's installation without any adverse result. The ideal is undoubtedly the service governor, and we must weigh the cost of that against the cost of laying a high-pressure main or making some other provision to maintain a constant pressure over a whole area.

There is also the question of meter accuracy. At 10 in. or more the meters are working against the gas undertakings to some extent. Again, there is the unaccounted-for gas. With old lead joints, loss of gas arises when the pressure exceeds a certain limit.

Weighing up all these factors, it seems to me that a pressure in the region of about 8 in. is as high as it is desirable to go.

Refractories and Slag Attack

Is there any definite proof that any highly aluminous refractory material, such as sillimanite, is more resistant to coke-ash slag attack than is silica material containing over 95% of SiO_2? Also, the opinion has been expressed that the more aluminous a refractory material is, the less prone to slag attack it is. From this statement, therefore, one is to assume that ordinary Fireclay, containing about 30% Al_2O_3 is less attacked than is a silica material. Is this true? What other advantages or disadvantages has such a material as sillimanite (about 60% Al_2O_3), when compared with silica brick, as regards:

(a) Thermal conductivity.
(b) Mechanical strength.
(c) Refractoriness under load.
(d) Resistance to abrasion.
(e) Resistance to attack by salty coals.
(f) Spalling.
(g) Cost.

Mr. **T. F. E. Rhead** (Chief Chemist, Birmingham Gas Department): I approached Mr. Green, of the British Refractories Research Association and he gave me information on the foregoing question. I am pleased to present it because it shows what the Information Department of the B.R.R.A. can do for those who have problems on refractory materials.

In a coke-ash slag the most important corrosive constituents are iron oxide and lime: a certain amount of alkalis may also be present. The action of a particular coke-ash will depend upon the proportions of these reactive constituents present. Moreover, the effect of the individual constituents cannot safely be considered separately, since the presence of lime, for example, has a profound modifying influence on the relative stability of the different oxide of iron.

Further factors which must be considered are the nature of the furnace atmosphere, the rates of reaction, and the nature of the reaction products. The problem is at present receiving further attention by the British Refractories Research Association and some interesting results are expected. For example, there are indications that mullite, the principal crystalline constituent of aluminous refractories of the sillimanite type, cannot exist in stable equilibrium in the presence of ferrous oxide. If this is confirmed, the well-known variable behaviour of sillimanite bricks in contact with ferruginous slags may be accounted for. Under oxidizing conditions, of course, quite different results would be expected.

A generalization on the comparative resistance to coke-ash of silica bricks and aluminous bricks cannot therefore be given at the present time. Confirmation of this viewpoint can be obtained from the Paper by H. R. Fehling on "Erosion of Refractories by Coal Slag" (J. Inst. Fuel, *11*, 451, 1938). Fehling calculated the theoretical solubilities of refractories in a typical coal ash slag at various temperatures, and with the slag in question (45%-50% SiO_2; 30%-35% Al_2O_3; 15%-20% Fe_2O_3; and 5% CaO) a silica brick has about the same solubility at 1,200°C. as a 35% Al_2O_3 firebrick, and about 50% greater solubility than a sillimanite brick. At 1,300°C., however, a silica brick, according to Fehling's calculations, would be only half as soluble as a 35% Al_2O_3 fire-brick and would, in fact, be no more soluble than a sillimanite brick. Fehling concludes that "with regard to the action of slag the value of a material can only be defined in relation to a particular slag within a certain range of temperature: in this field any generalization is dangerous and should not be attempted."

The Gas Turbine Engine

Is there any future for the Gas Industry in the invention of the Gas Turbine Engine?

Dr. **J. G. King** (Gas Research Board): This question is an apt one in directing attention to an important modern development which has recently been attracting the attention of scientists and engineers. Although the idea of the combustion turbine dates back to John Barber in 1791, it is only within the last 10-15 years that it has become possible to regard it as a practical power unit. The reasons are mainly the advances that have been made in the design of rotary compressors and the development of heat-resisting metals for the turbine blades which can withstand the high temperature necessary for high efficiency. These advances are being supplemented by the combustion researches concerned with the development of jet-propelled aircraft.

In its simplest form, the power unit involves a compressor to supply air to a combustion chamber, from which the hot gases do work by expansion through the turbine, the useful work done being, of course, the difference between the positive work of the turbine and the negative work done in compressing the air. Power installations using this simple system are easy to operate and maintain and require no water for cooling or consumption. Their thermal efficiency is, however, not high, and in modern arrange-

ments efficiency and power output are increased by:

(i) Compounding the compressor and cooling the air between stages.

(ii) Compounding the turbine and adding heat by supplementary combustion between stages.

(iii) Recovering heat from the turbine exhaust gases, and utilizing this either externally to the cycle by raising steam or internally by interchange with the air.

Many variations are possible, favouring either thermal efficiency or output or both. To take one example, two-stage compression with full cooling, and a two-stage turbine with intermediate combustion chamber, will increase efficiency by 77% and output by 55% over the performance of the simple cycle.

In an external combustion system designed by Professor Ackeret and Dr. Keller, of Zurich, the working substance is air or any other convenient gas, and the heat is supplied to it by conduction through a combustion heat exchange chamber. The hot exhaust from the turbine also heats the working fluid by interchange. An experimental unit made on this principle by the Escher-Wyss Engineering Company, of Zurich, is reported to have generated 2,000 kW. with an overall efficiency of 31.5%. This system has special advantages in that the working gas remains clean, and that the source of heat can be waste gases, provided only that they are at a sufficiently high temperature: high pressure is not essential.

In most of its applications so far the turbine has used oil fuel, but it can be calculated that the greater pressure required for injecting gaseous fuels and the lower weight ratio of fuel to air to give maximum working temperature does not reduce either thermal efficiency or output by as much as 2%. Town gas might, therefore, be used for the generation of electric power in special circumstances where, for example, there was a shortage of water. Normally, however, the cost of town gas would prevent its use for this purpose. An experimental unit plant, placed in favourable circumstances, possibly at a coke oven, might provide useful experience and data.

The Ackeret-Keller turbine offers more promise of application in the Gas Industry as a means of providing power from waste heat, and of thereby balancing the power and steam requirements of a works. The waste gases from retort settings could be passed directly to the heat exchanger, while the heat in the spent gases and in the turbine exhaust gases could be utilized for raising low-pressure steam for process use. To quote Major Gregson (J. Inst. Fuel, 1946, *19*, 129), a vertical retort setting of 240 tons of coal per day would provide 550 kW and 4,500 lb. of steam as against 13,000 lb. of steam from a waste heat boiler alone.

The balancing of fuel, steam, and power requirements on a works must always be affected by local conditions, and there may well be circumstances in which a turbine may be applied. Consideration of the problem would involve such questions as the maintaining of steady electrical output by providing means of augmenting the waste gases by burning producer gas or coal gas, the relative requirements of high and low pressure steam, day and night electric loads, and so on. I commend such considerations to you now. We can fairly assume that the former difficulties in the way of development of the combustion turbine have been largely removed, and that thermal efficiencies of the order of 32% or more can be assured.

If you require data for these considerations I would refer you to the monograph on this subject, confidential to members of the Gas Research Board, which the Board is about to circulate as Information Circular No. 3.

Atomic Energy and the Gas Industry

What will be the effect of the discovery of the release of Atomic Energy on the Gas Industry?

Dr. **J. G. King** (Gas Research Board): The question of the harnessing of atomic energy to meet industrial requirements for fuel has been in all our minds since we first realized the remarkable scientific advances which had been made in producing atomic bombs from uranium and plutonium. The question involves not only the scientific and technical problems of utilizing atomic energy for power, but the sociological and political problem of how to control its use and prevent its being used for purposes of destruction. The latter may well delay the development of the former, but it is obvious that the industrial aspect will become of increasing importance in the future as reserves of coal and oil diminish.

How soon atomic energy will reach the stage of industrial application is very difficult to assess at present, in view of the complicated processes involved and the necessity for reducing their costs to an appropriate level. It is obvious that, although these processes are known scientifically, their evolution to an industrial scale must still involve much time and effort.

The elements which can at present be considered sources of atomic energy are uranium, thorium, plutonium, and neptunium. World surveys will have to be made of their occurrence and arrangements made for collecting and refining them in sufficient quantity. That there is a sufficient quantity seems accepted; it is estimated, for example, that the earth's crust contains four parts uranium and twelve parts thorium per million. The separation of the active element will involve the building of very large chemical plants. To take uranium as an example, the 235 isotope comprises only 0.7% of natural uranium and its separation has involved the thermal diffusion of the fluorides, a difficult and tedious process.

The problems involved in the building of the power units are not perhaps so obscure. The basic difficulty is the adequate control of the heat of fission to achieve a balanced rate of emission of energy, the prevention of corrosion (the products of fission are highly corrosive to metals), and the adequate screening of the unit or cell to prevent the escape of emanations dangerous to human life.

How long these developments will take is impossible for any outside observer even to guess. Among those with full knowledge of the problems, opinion is divided. Professor Blackett considers that the development of a power unit involves only straight-forward scientific engineering and should lead to the building of a large land power station within 10 years. Dr. Oppenheimer (U.S.A.) has said that while the completion of a station to produce one million kW. is "not far off," it will take a long time to discover if atomic energy can produce power cheaper than coal. A British Government opinion expressed by the Minister of Supply is that there is no justification for the belief in a quick or easy solution and that it is doubtful if the achievements of the next 10 years will involve any real industrial application.

All of them agree, however, that the first power application will be to very large units for the production of electricity. Smaller units, even for very large ships, can follow only much later, while still smaller units are still only a remote possibility. An earlier application to medical research and therapy is expected. In the case of large power stations you will realize that, since the fuel cost in the present systems is only about 25% of the total, the possibility of a large reduction in cost by changing the fuel from coal to atomic energy is only remote. Whether any saving at all is possible can only emerge when the scientific processes involved have been fully industrialized. We all know that plants of new design take time to reach their final (economic) form; although a very considerable effort will be made to speed developments, the same will probably be true in this case.

If the 10-year estimate for a prototype plant is near the truth, we may well expect a further 10 years of development to follow before minimum cost is reached. If by then the electricity industry should have ceased to use coal, but has not reduced its unit cost of power, there seems no clear reason why gas should not remain an alternative fuel. The outcome will depend upon costs, upon the incidence of its natural advantages over electricity for certain purposes, and upon whether an enlightened world will be willing to continue the so unpopular profession of coal-mining.

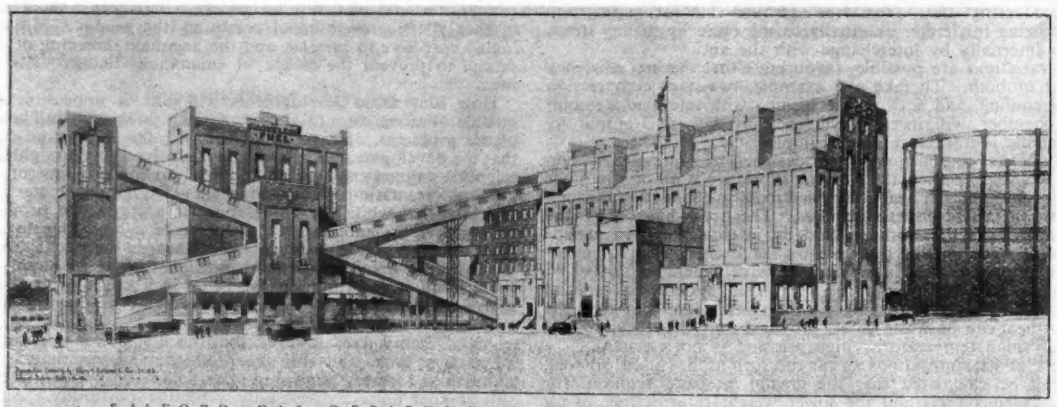
Education by Correspondence

May arrangements, please, be made for a special Correspondence Course to be designed for ex-servicemen, who, before the war had qualified in the Ordinary Grade of Gas Engineering (Supply) or (Manufacture), up-grade to the Higher Certificate, and consequent Associate Membership of the Institution?

Mr. **A. G. Higgins** (Assistant Secretary, Institution of Gas Engineers): The rehabilitation of ex-servicemen, whose training was interrupted by war service, has been the subject of special consideration by the Gas Education Committee and reference has already been made to it both in the President's Address and in the 83rd Annual Report of the Council. Two full-time Intensive Courses have been set up, one at Bournemouth and the other at Birmingham, to deal with students of the standard quoted by the questioner—*i.e.*, students already in possession of the Ordinary Grade Certificate. Negotiations are proceeding in connexion with the initiation of further Courses, both for the Ordinary Grade and for the Higher Grade Certificates.

The questioner refers to a special Correspondence Course. It may be that he was unaware of the arrangements that have been made for full-time courses or, alternatively, that he is unable to take advantage of a full-time course. Excellent correspondence courses are conducted by the College of Fuel Technology, the Technological Institute of Great Britain, and Wolsey Hall, any of which would appear to meet the case of the students in question, for being external students there is no limit of time for entry for the Higher Grade Examination and they may enter as soon as they feel prepared. The length of time required by students, studying by means of correspondence courses, to reach the Higher Grade standard, depends entirely upon the facilities at their disposal for study and upon their ability to acquire the necessary knowledge. There is, therefore, no need to augment the correspondence courses already available by a special course, particularly as grants are paid by the Ministry of Labour and National Service to ex-service men qualifying under the Government's Further Education and Training Scheme for such correspondence courses if the men are unable to attend a full-time Intensive Course.

Although there is no reference in the question to the standard of examination, the questioner may perhaps have envisaged a special examination of lower standard for the benefit of ex-service men. This is also a matter to which the Gas Education Committee has given considerable thought and it has been decided that, in the long run, it is not in the interests of the students themselves.



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On the London Stock Exchange

Shares of most companies associated with the Gas Industry experienced a smaller amount of business during the past month compared with the month preceding. But the total volume was still of considerable size and once again several fresh high levels for all time were established.

Among highest-priced shares, features in this respect were seen for the £1 Ordinary class of Thos. De La Rue, which closed nearly four shillings higher at £12 7/16ths, after having at one time changed hands up to £13½. Dealings continued to be freely transactable up to five hundred share amounts with only half a crown difference between buying and selling figures. They were consequently one of the most marketable of their class in the entire Stock Exchange, and it might be noted that the annual report is due next month. This time last year, when the shares stood around £11⅜ to yield 3½%, profits showed an increase of over £200,000. A new high level was also recorded by International Combustion £1 Ordinary, which closed five shillings higher at £9¾, but here only selling orders were immediately practicable. The 1946 low levels for these two shares were £9 27/32nds and £8 3/16th respectively. Dearth of floating supply continued for Glover & Main £1 Ordinary, which closed at the fresh high level of 90/—*i.e.*, half a crown better on the month and seven and sixpence above their lowest for the current year. Tube Investments, Ltd., £1 Ordinary, which controls Bromford Tubes, Ltd., closed the turn easier at £6 7/32nds. This year's high and low is £6 11/16ths and £5 9/16ths respectively.

Among medium-priced issues, a good degree of marketability continued to be displayed by Radiation Ltd., £1 Ordinary, which closed sixpence easier at 66s. Their low for 1946 is 57s. 6d. Similar characteristics were displayed by Imperial Chemical Industries, the parent company of Amal and of Welsbach Light, the £1 Ordinary Units closing one and ninepence down at 43s. 3d. after having once been transferred as low as 41s. 3d. This last figure was recorded during the two day reaction which all markets recently experienced, but which was very soon recovered. A fall of one and sixpence was registered by Allied Ironfounders £1 Ordinary, which closed at 57s. 9d., but with still an average degree of marketability. More difficult dealing conditions continued to be displayed by Whessoe 5s. Units, which closed unaltered at 47s. 6d.—*i.e.*, with the nine shilling rise they achieved last month still held. Restricted conditions were also displayed by Head Wrightson £1 Ordinary, which finished without quotable change at 34s. These last named shares are normally marketed on the Newcastle Stock Exchange. Nineteen forty-six highs and lows for Imperial Chemical are 45s. 6d. and 39s. 3d., for Allied Ironfounders 60s. 3d. and 53s. 3d., for Whessoe 47s. 9d. and 36s. 6d., and for Head Wrightson 35s. and 26s. 3d. A feature among the medium-priced section was supplied by the 10s. Ordinary class of Peter Brotherhood, which closed over three shillings better at 41s. 3d. (1946 low: 35s. 9d.) with dealings up to one thousand shares freely transactable. The report of this Company is due next month, and last year a total distribution of 20% was made. Profits, after providing for all outgoings, including income-tax and E.P.T., was £33,210, add amount brought forward of £139,687, making a total of £172,897. A sum of £10,000 was allotted to Special Repairs and Renewals, and £140,859 was carried forward. In this Company, the Ordinary shares carry one vote, whilst the Preference shareholders only vote in certain circumstances. Firmness and free dealing conditions up to two thousand share amounts were also reported for Broom & Wade 5s. Ordinary, which closed sixpence better at their existing high level of 32s. (1946 low: 25s. 3d.) Weakness, but an average degree of marketability, was evident for Sydney Flavel 4s. Ordinary, which finished at the new low level for 1946 of 15s. 9d. (1946 high: 17s. 3d.). A sixpenny fall was recorded by Parkinson & Cowan £1 Ordinary, which closed at 17s. (1946 high and low: 19s. 6d. and 13s.), but outright business here continued difficult. Oxley Engineering 5s. Ordinary were a better market from the dealing point of view, but still not entirely free, and closed almost unaltered at 11s. 9d. (1946 high and low: 12s. and 10s. 3d.), after having been transferred down to 11s. meantime.

Among lowest-priced shares, the best degree of marketability continued evident for Barton & Sons 5s. Ordinary, which closed a shade easier at 9s. 4½d. (1946 high and low: 10s. 1½d. and 7s. 9d. respectively), after having been the centre of some fair-sized business. A shilling fall and free dealing conditions up to one thousand share amounts were reported for Leeds Fireclay 10s. Ordinary, which closed at 9s. 9d. (1946 high and low: 10s. 9d. and 6s. respectively). Wm. Neill & Sons (St. Helens) 2s. Ordinary closed the turn easier at 5s. 9d., with orders up to one thousand shares easily transactable. Their high and low for the current year is 6s. 7½d. and 5s. 4½d. respectively.

Completely stagnant conditions continued to prevail for W. H. Dean & Sons 5s. Ordinary around 23s. 9d., for Hick Hargreaves £1 Ordinary around 35s. and for Gas Purification & Chemical £1 Ordinary around 24s., no shares at all being available, but relatively large amounts easy of placing if they had come on offer.

Primitiva Gas Company

The annual meetings of the Primitiva Gas Company of Buenos Aires, and its parent company, Primitiva Holdings, Ltd., were held in London on July 9. The profit and loss account and appropriation account of the Primitiva Gas Company, taken together, showed a profit for the year ended Dec. 31, 1945, of only £5,800, and the carry-forward was increased by that amount to £123,500. In view of the embargo by the Municipality of the City of Buenos Aires on the expropriation deposit in respect of its claims for alleged excess profits, the Directors were unable to recommend a dividend.

In his statement issued with the report and accounts, Mr. W. M. Codrington, who is Chairman of both companies, said the undertaking of the Primitiva Gas Company was taken over by the Argentine Government on Mar. 5, 1945, under an expropriation decree dated April 13, 1944. In applying for expropriation the Government authorities pleaded that the deposit of £227,000 which they were prepared to make represented a fair value of the Company's assets, after deducting the alleged cost of removing the mains from under the streets of the Capital. The Company was successful in getting the deposit raised to £1,031,000, but this figure was arrived at after deducting £664,000 for the theoretical cost of the withdrawal of the Company's mains; actually the mains, which were in excellent condition, continued to be used by the Government authorities.

Under the expropriation law in force at the date of the decree the value of the property expropriated had to be determined by the Court after hearing the evidence of experts appointed to represent both parties. Subsequently the law was altered by a decree which dispensed with the appointment of joint experts and substituted what appeared to be a less satisfactory procedure. In February, 1945, the Municipality of the City of Buenos Aires advanced a claim against the Company for £1,608,000 in respect of profits alleged to have been in excess of those allowed under the Company's Municipal contract, and obtained a preventive embargo on the deposit made in court in favour of the Government.

In September, 1945, the Argentine Federal Court recognized the Company's right to appoint its own expert for the valuation and declared the pertinent part of the expropriation decree, which denied that right, to be unconstitutional. In October the Argentine Government appealed to the Supreme Court against that judgment, but in April of this year the appeal was disallowed. As a result the Federal Judge has confirmed the appointment of experts to represent the Government, the Company, and the third expert contemplated by the expropriation law. Thus the Company's expert had now been given official status and the right to be heard when the value of the assets was argued before the Supreme Court.

The Chairman's statement continued: "Our Local Committee in Argentina, and more particularly Mr. Grant and the senior members of his staff, who are still standing by us in our difficulties, have had a trying year; the situation of the personnel is not made easier by the knowledge that in successfully clearing up the Company's affairs, they are bringing nearer the time when we shall no longer require their services. On a previous occasion I mentioned that we have promised eventually to treat these officers with the consideration which the Board are convinced the shareholders would wish to extend to them; moreover, without their services at the present time, we should be in a sorry plight. We take no part in Argentine politics, but it is perhaps permissible for us to congratulate General Peron upon his appointment as Argentina's new Chief Magistrate, and to wish him every success in the task which he has undertaken. We are gratified to have read in the Press of General Peron's assurance of fair treatment for foreign Capital; and this expression of opinion, coupled with our faith in the high reputation of the Argentine Courts, gives us confidence that in the end a fair and reasonable settlement of our affairs will be reached."

A New Method of Painting water-sealed gasholders, which produces the finest finish at a substantial saving in cost, has been adopted in America. Manual painting is eliminated, the paint floating on the surface of the water in the holder cups. Only paint of controlled viscosity and gravity characteristics can be employed and, although more paint is floated on the water surface than is actually used to cover the section of the holder, the excess may be recovered. The paint must float from one to four inches in depth. The holder lift to be refinished is submerged to the full depth of the holder tank, the dry surface of the lift dragging a "curtain" of paint down with it. Pressure of water in the tank forces the paint to cover the surface of the holder lift completely and evenly. As the lift rises, surplus paint flows off to float again on the water surface, where it is recovered by a device which consists of a funnel whose lip is held just below the paint surface and well above the water surface and which pulls the paint back by a suction hose at its base. Experiments have proved that aluminium or black is most suitable.